



The rocket's red glare may be seen over MSC August 17 through 21 when over 2500 model rockets will be launched during the Twelfth National Model Rocket Championship meet. Sponsored by the National Association of Rocketry, it is expected that approximately 200 modelers from throughout the United States will descend on the Center.

MSC Site for National Rocket Competition by 200 Contestants

The Twelfth National Model Rocket Championship Meet of the National Association of Rocketry will be held at the Manned Spacecraft Center, August 17-21. Over 2500 model rockets will be

Outplacement Unit Set up at MSC

An Outplacement Center has been established in Building 45 to assist employees affected by the impending reduction in force, Jack Lister, the Personnel Officer, announced today.

The Outplacement Center, located in room 546, is designed to supplement the efforts of individual employees to find suitable employment. It will be open from 8 a.m. to 5 p.m., Monday through Friday, beginning several days after the reduction in force notices are distributed.

Outplacement Counsellors will assist surplus employees in such areas as developing potential sources of employment, referring employees to appropriate job vacancies, and explaining regulatory (Civil Service) re-employment rights. Lister indicated, "We have been working tremendously hard to develop leads, and even at this early stage we have had some positive responses. However, it will take all our collective imagination and talent to make it clear to employers the very high level of experience and ability we have been forced to give up. Therefore, I am asking all Center employees, including our senior staff, to exert a concentrated effort to refer any job leads, known or suspected, to our Outplacement Committee. They will pick it up from there."

(Continued On Page 2)

launched during the five day event to be attended by over 200 modelers from throughout the United States.

The model rockets, made of paper tubing, balsa wood and plastics and powered by commercially manufactured solid propellant fuel rocket motors, will be flown in a variety of competitive events. The meet will determine the senior, leader and junior national champions who will receive the Bendix Trophy for excellence in model astronautics.

Many of the rockets, similar in construction to model airplanes, will be exact scale models of launch vehicles used by NASA and the Armed Forces. Other events will include egg lofting, parachute duration, spot landing, boost/glide and design efficiency.

The aeromodeling event is sanctioned by the National Association of Rocketry, the largest non-professional rocketry organization in the world. The association is an affiliate of the National Aeronautic Association and the Federation Aeronautique Internationale.

Hurricane Aid...

Lakeside Boat Storage has announced that it will receive donations of canned food, clothing, bedding and distilled water for victims of Hurricane Celia. This organization has volunteered its services in providing transportation of items to the area affected.

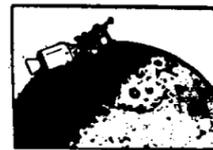
Lakeside is approximately one-half mile west of Seabrook on NASA Road No. 1.

MSC employees who wish to donate items are invited to take them to this location.

ROUNDUP

NASA MANNED SPACECRAFT CENTER

HOUSTON, TEXAS



VOL. 9 NO. 21

August 14, 1970

RIFed MSC Employees to Get Pink Slips Momentarily

Notices to MSC employees who will be affected by the reduction in force will be issued momentarily. All separations, re-assignments and demotions in connection with the reduction will be completed by October 1, 1970.

It was announced July 15 in Washington that NASA would reduce its manpower by 900 per-

sons. MSC's portion of this was to be 150; however, management here advises that the reduction will be closer to 200 positions.

Employees who receive separation, reassignment or demotion notices associated with the RIF will be entitled to review the retention registers and discuss with personnel management specialists any aspects of the action. Retention registers will be available for review on the first floor of Building 2.

Supervisory personnel of affected employees may also review the registers and files at the same location.

Any employee who questions the action taken in his case is entitled to conferences with personnel management specialists.

Salary retention provisions will apply to those employees who are changed to a lower grade by reduction-in-force procedures, provided the employees meet the necessary requirements.

For example, if an employee has a career or career-conditional appointment and has served with NASA for two or more years in grades above the grade to which

he was demoted, he may retain his present salary for two years.

However, an employee being demoted more than three grades will not retain full salary but will receive an adjustment based on a special formula.

An employee demoted with less than two years in grade will receive an adjustment not to exceed the top step of the grade to which demoted.

An Outplacement Center will be established in Building 45 for those employees who receive separation or demotion notices. The committee will assist in finding new positions for the affected employee.

Companies and other government agencies are being contacted for participation in the outplacement program.

Houston constitutes the competitive area for MSC employees working at MSC. The competitive area for MSC employees whose duty stations are other than Houston is determined by their official duty station as follows: (1) Cape Kennedy, Florida, (2) White Sands, New Mexico, (3) Los Angeles area, and (4) Bethpage, New York.

Visitor Hours

The Manned Spacecraft Center on August 15 will initiate a seven-days a week open house program in response to public requests. New open house hours will be from 9:00 a.m. to 4:00 p.m.

Included in the program are film and exhibits in the auditorium; the Central Data Office (Building 12); mission Simulation and training facilities (Building 5), and the Flight Acceleration Facility located in Building 29.

The cafeteria (Building 3) also will be open to accommodate the guests.

No reservations are required and there is no admission charge.

Recent Retirees at MSC



Charles L. Coston



Luther L. Hoover



James A. Caudel



J. Wallace Ould



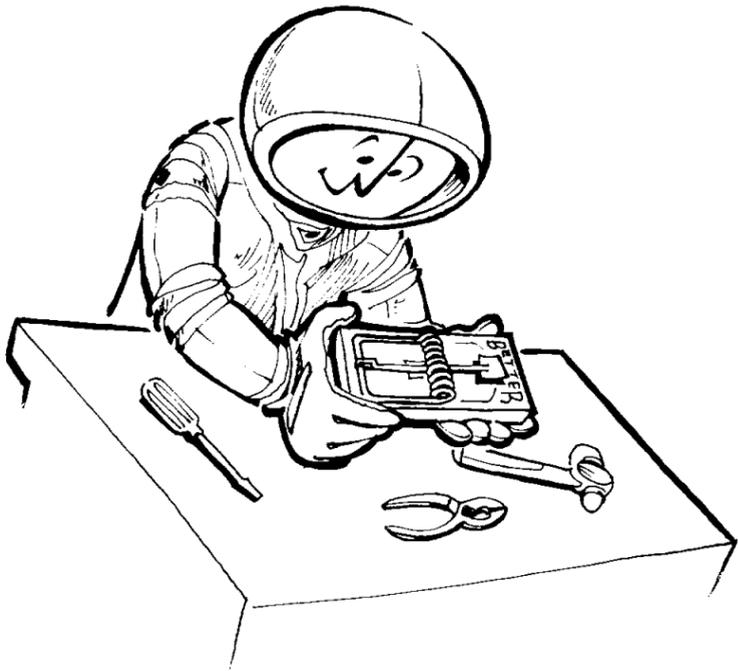
L. Gordon Cooper



Shell Martin

THE ASTRONAUTS

courtesy of TRW's gordon a. south



MSC Signs Apollo Contract With NAR

The National Aeronautics and Space Administration has signed a supplemental agreement with North American Rockwell Corporation, Downey, California, valued at approximately \$92,449,970 for changes in the Apollo command and service module contract.

The agreement formally incorporates into the North American contract a change to increase the mission duration, add a Scientific Instrument Module (SIM) to accommodate lunar orbit experiments, and to provide experiment integration. Adjustments to the contract delivery schedules are also included.

The modification brings the total estimated value of the North American cost-plus-fixed-fee/award-fee contract since August 1963 to approximately \$3,724 billion.

The principal portion of the contract work is being performed at the California facility. Other divisions of the contractor, and many subcontractor organizations also participate.

In addition, launch support operations will be performed at the Kennedy Space Center, Fla., and related test activities will be carried out at the Manned Spacecraft Center, Houston.

NASA Reviews Remaining Apollo Flights

The National Aeronautics and Space Administration is developing two alternative plans for the future of the Apollo lunar exploration program and has asked two scientific advisory boards for their views on these alternatives.

NASA Administrator Thomas O. Paine has asked NASAs Lunar and Planetary Missions Board and the Space Science Board of the National Academy of Sciences to consider the alternatives. Representatives of the boards will present their views at a meeting with NASA management during the week of August 24. The NASA management group will make a decision on the future course of Apollo following the meeting.

Alternative number one is to fly the remaining six Apollo missions as presently planned. Alternative number two would delete two of these missions.

The Apollo schedule now calls for Apollo 14 to be launched Jan. 31, 1971, with Apollo 15, 16 and 17 following at approximate six-month intervals. The Skylab workshop and three astronaut revisits would be flown late in 1972 and 1973 and then Apollo 18 and 19 would be launched in 1974.

Sustained Superior Performers



W. W. Kemmerer, Jr.
Medical Research and Operations Directorate

Frances P. Moore

U of H Course Sign-Up Set for August 21 at MSC

Registration for the University of Houston - Clear Lake Graduate Center fall semester has been scheduled for August 21, 1970, from 9:00 a.m. to 11:30 a.m. and 1:00 p.m. to 3:30 p.m. in Building 1.

Late and combination registration will also be held in Building 1 on Friday, August 28, 1970.

All employees who will take classes both on the main campus and at the Clear Lake Center

simultaneously must register on the main campus first. Student advisors will be available during the registration period. Class room assignments will be given at the time of registration.

MSC form 75's are due in to the Training Office (BP3) no later than August 17, 1970.

The list of the proposed courses to be offered in Clear Lake includes the following:

COURSE & SECT.	TIME	COURSE TITLE	INSTRUCTOR'S NAME
ARTS & SCIENCES			
Department of Mathematics (MTH)			
MTH 463A (U991)	430-6 PM TTH	Numerical Analysis I	(Morris)
MTH 633 (T991)	3-430 PM TTH	Real Variable Theory	(Decell)
MTH 665 (J991)	3-430 PM MW	Functional Analysis	(Wiginton)
MTH 685 (U991)	430-6 PM TTH	Selected Topics in Applied Mathematics	(Decell)
Department of Physics (PHY)			
PHY 390 (J991)	330-5 PM MW	General Astronomy	(Kovar)
PHY 697 (J992)	330-5 PM TTH	Electromagnetic Theory	(Oldham)
Department of Political Science (POL)			
POL 383 (J992)	3-6 PM MON	Intergovernmental Relations	(Feld)
POL 762 (J992)	3-6 PM WED	Seminar in Public Administration	(Farley)
Department of Psychology (PSY)			
PSY 331 (T991)	3-6 PM THU	Psychology of Business and Industry	
BUSINESS ADMINISTRATION			
Department of Behavioral Management Science (BMS)			
BMS 630S (T991)	3-6 PM TUE	Research	(Holland)
BMS 632 (T991)	3-6 PM TUE	Human Behavior in Organizations	(Holland)
ENGINEERING			
Department of Industrial Engineering (I E)			
I E 471 (A991)	730-9 AM TTH	Operations Research I	(Dawkins)
I E 567 (A991)	730-9 AM TTH	Advanced Computer Techniques	(Smith)
Department of Mechanical Engineering (M E)			
M E 660 (O991)	730-9 AM TTH	Introduction to Advanced Dynamics	(Eichberger)
M E 730 (J991)	4-530 PM MW	Selected Topics— Optimization Techniques I	(Lewallen)
M E 730 (U992)	4-530 PM TTH	Selected Topics— Orbit Determination	(Born)
M E 730 (B993)	730-9 AM MW	Selected Topics— Optimization Theory	(Detchmendy)
M E 736 (J991)	4-530 PM MW	Advanced Fluid Mechanics III - Boundary Layer Flow	(Dalton)

OUTPLACEMENT—

Continued From Page 1

The Committee can be reached on extension 5437. The leads already developed will be made available to employees registering for the Outplacement Center.

The Texas Employment Commission (TEC) will also provide help. They will have several members of their staff in our Outplacement Center to assist employees in applying for TEC's

local, state, and nationwide referral and placement service.

Any private companies or government agencies wishing to interview in Houston will be invited to an Employment Center beginning around September 1. Employees registering for the Outplacement Center (to register you must complete a Career Information Resume) will be included in the Employment Center.

Just us Two....

With Gordon Cooper's decision to leave the astronaut corps and enter private enterprise, it is noted that the original "We Seven" is now down to just two.

The remaining pair is Alan Shepard who will command the Apollo 14 flight to the Moon

NASA Names RCA to Build Rover TV Unit

The National Aeronautics and Space Administration has selected RCA Corporation's Astro-Electronics Division, Princeton, New Jersey, to build a ground-commanded television system for use in the last four Apollo lunar exploration missions.

The \$1.62 million cost-plus-fixed-fee contract covers flight hardware for color television cameras and remote control units which will be compatible with existing Apollo real-time command systems at Manned Space Flight Network tracking stations. The color camera is similar to the field sequential camera used on previous Apollo missions.

The system permits the camera to be operated remotely from Earth or manually by Apollo crews. When it is connected by cable to the lunar module batteries and S-Band transmitter, operation is manual.

Used with the lunar roving vehicle (Rover), the camera system can be earth-commanded on or off, pan and tilt, zoom lens focal length and switch automatic light control from "peak" to "average." A rover-mounted camera conceivably could relay to Earth a view of lunar module liftoff, depending on Rover battery life remaining.

sometime after Jan. 31, 1971, and Donald "Deke" Slayton, who now directs the astronauts' training at MSC.

Of the original seven no longer in the astronaut business, Wally Schirra has joined a heavy equipment firm and has other business interests; John Glenn, who unsuccessfully sought political office is an executive in soft drink exports and has other business interests; Gordon Cooper has also entered foreign trade and has other business interests; Scott Carpenter, the astronaut turned aquanaut, entered private enterprise in undersea research ventures; and Virgil "Gus" Grissom was one of the three fatalities in the AS-204 spacecraft fire at Cape Kennedy in January, 1967.

Gordon Cooper's new business interest is headquartered in the Houston-area. In addition to the original seven several other well-known astronauts have left. Three are in Washington. Mike Collins now resides in that area. The others are William Anders, who flew in the famous Christmastime flight around the Moon with Borman and Lovell and is now Executive Secretary of the President's Space Council, and Neil Armstrong, the first man to step on the lunar surface, who has just taken over new duties as director of all NASA's aeronautical research programs.

Another astronaut who left the corps for a new assignment, is Donn Eisele, now assigned to NASA's Langley Research Center—not too far from Washington. He is an advisor on manned spacecraft systems in which the Langley Center is conducting studies. Eisele flew with Wally Schirra and Walter Cunningham in the first manned Apollo flight, Apollo 7, in October, 1968.

Hurricane Damage Assessment Made by Earth Resources Unit

Hurricane Celia's swath of destruction across the lower Texas coast last week was recorded by survey cameras aboard an HC-130 of the MSC Earth Resources Division. The damage assessment survey mission was flown August 6 over the Corpus Christi and Mustang Island area to record on color and color-infrared film the damage done by Celia crossing the coast August 3.

Flying at an altitude of 3000 feet, the aircraft's cameras photographed minute detail of the destruction below—exploded trailer houses, unroofed houses and public buildings, beached ships and barges, and a jumble of wrecked aircraft in hangars at Corpus Christi Airport.

Photographs nine inches square

were made at intervals with a 60 percent overlap with each preceding frame. The cameras peer straight downward through optically-pure glass windows in the belly of the HC-130 Herky Bird. The weather was ideal the day the mission was flown—few clouds and little or no haze.

Seen through a stereo viewer, the overlapping color photos produce a vivid record in three dimensions of the effects of 160-mile winds blowing across the surface three days before.

Parallel runs back and forth across the city from east to west, a quick 180-degree turn and another pass, gave almost complete coverage of the downtown and suburban areas of the city. Additionally, runs were made along the upper Corpus Christi



Dorothy Holloway
E & D Directorate

bay as far as Rockport and Aransas Pass. On the return to Ellington AFB, a sweep was made along Mustang Island and Port Aransas, and continued along St. Joseph Island and Matagorda Island, where sundown forced termination of the mission.

Prime Contractor List Reveals Varied NASA Tasks

The NASA-wide space effort reflects a variety of manned and unmanned programs as is evidenced by the list of prime contractors (below) who are developing vehicles for space research.

Emphasis has been on manned missions during the past several years, but equally important are those efforts which probe the secrets of Mars, Venus, the Sun and others.

List follows:

PROJECT	PRIME CONTRACTOR	
SPACE STATION	McDonnell Douglas North American	Program Definition (Phase B) parallel 11-month studies announced July 23, 1969 \$2.9 million each
SPACE SHUTTLE	Grumman/Boeing Chrysler Aerojet-General North American Pratt & Whitney	Phase A (feasibility) 11-month studies - different concepts Parallel 11-month Phase B design definition studies for main propulsion system; \$6 million each
	McDonnell Douglas North American	Parallel 11-month Phase B preliminary design and definition studies for two stage vehicle; \$8 million each
LUNAR ROVING VEHICLE SKYLAB	Boeing North American	\$19 million contract for four flight-qualified LRVs modification of four Apollo spacecraft for Skylab and mission support. \$340 million
ATM (Apollo Telescope Mount) VIKING	Martin Marietta Honeywell Hughes	Payload integration \$98 million Multispectral scanner \$3 million
	Martin Marietta General Electric	Viking Lander System and Technical integration, \$280 million Three years' engineering and mission related support to Langley; \$4 million; option for two years more
MARINER MARS 71	JPL	To be selected around end of 1971
MARINER VENUS MERCURY 73	Johns Hopkins Applied Physics Lab	
GEOS (Geodetic Explorer)	General Electric	\$50 million for two spacecraft, modified version of Nimbus
ERTS (Earth Resources Technology Satellite)	RCA	
ITOS (Improved TIROS)	TRW	Follow on to Pioneer contract \$38 million for two Jupiter bound spacecraft with multiple incentives
PIONEER F and G	Grumman Ball Brothers	
OAO	Philco - RCA - Fairchild	
OSO (Orbiting Solar Observatory)	RCA - Hughes	4-month definition and design studies; \$250,000 each
RAE (Radio Astronomy Explorer)	In-house (Goddard)	
Atmosphere Explorer, AEC and AED	Westinghouse and Aerojet General Electric	\$18.7 million for two engineer and test program
SAS (Small Astronomy Satellite)	McDonnell Douglas	
NERVA Quiet Engine	Northrop Aerojet; Applied Physics Lab	
90-Day Life Support Test Lifting Bodies OFO (Orbiting Frog Otolith)	North American Rockwell	

Roundup Swap-Shop

(Deadline for Swap-Shop classified ad is Thursday of the week preceding Roundup publication date. Ads are limited to MSC civil service employees and assigned military personnel. Maximum length is 15 words, including name, office code and home telephone number. Send ads in writing to Roundup Editor, AP3.)

MISCELLANEOUS

15-hp Michigan Marine Senior Twin engine, Paragon gear, starter and generator needs repair. White, 932-4472.

Dark brown, human hair fall, set and styled, \$25. Boin, 488-1244.

14-foot sailboat, Hobie Catamaran, with trailer, three months old, must sacrifice. Akin, 941-1631 after 5:00.

Outdoor patio gas grill on stand, \$35; Kenmore washer and dryer, \$20 each, Underwood typewriter, \$25. Moser, 877-3048.

Piano lessons in home (Dickinson), beginner and intermediate level's Parker, 534-5338 after 5:00.

Large ironer in cabinet, \$35; modern solid walnut coffee table, \$20. Admiral black and white television in working condition, \$15. High, 591-3254.

6'4" surfboard and racks, cost \$90, will sell for \$30. Berkstresser, 877-1262.

O'Keefe and Merritt range, gas, large oven, broiler, top grill, white, \$45. Hudson, 534-2180. 1969 12-foot Quachita aluminum V hull boat and galvanized trailer. Also older 18 hp Johnson Outboard with tank and remote controls. Whole rig \$300, or motor separate. Minar, 877-3028.

Wurlitzer Baby Grand piano, \$850; baby stroller, \$5; baby high chair, \$5; baby swing, \$5; Stevens 410 gauge shotgun, single shot, \$20; 1969 Cameo travel trailer with air conditioning, 17-foot, \$1,700; Used USAF official jet flight helmet with oxygen mask and shaded eye shield, \$25. Donnell, 877-1746.

Ludwig drum set; seven pieces, one snare, two tom toms, one base, two ride cymbals, one foot cymbal and stool, \$350. Tunello, 488-1990.

GE refrigerator, 16 cubic foot, brown, frost free, like new, \$175; washer and dryer, RCA whirlpool, white, excellent condition, \$110 for both or sell separately. Herron X3578.

Apollo snare drum, case and stand included, excellent condition, \$30. Hodge, 591-2152.

Ampex 850 tape recorder, \$100; Garrard AT6 automatic turntable, \$30. Herman, 487-2466.

19" Toro lawn mower with pickup bag, good running condition, \$30. Gammon, 471-2542.

Three sets, four each, J-R aluminum duplicate bridge boards, \$7.50. Hardeman, 471-4776.

1969 Coldspot air conditioner, 22,000 BTU; acetylene welding equipment, includes torches, 1000 feet of hose, victor gauges with accessories. Frazier, 485-3521.

Clear Lake Country Club full membership, transfer fee paid 591-3353.

Kawasaki 100 CC, trail boss, excellent condition, \$300. Lizza, 932-4463.

Window fan, adjustable, safety blades, 20", used only four days, \$15. Biggs, X5566.

Honda 305 Super Hawk, Thomas, 482-3680.

Deluxe refrigerator-freezer, 14 cubic foot, frost free, copper-tone, like new, reasonable price. Montague, 488-1143.

Beautiful silk organza wedding gown with mantilla train. Speller, 932-5653 after 5:00.

Two 300-pound sets of weights and dumbbells, \$35 each; 1967 Harley Davidson 74 full dress, \$1,500. Bray, 482-1643.

IBM electric typewriter, 18" carriage, good condition, \$120. A. B. Dick Model 90 mimeograph in working condition, best offer. Tremant, 488-0159.

Clear Lake Country Club social membership. Will consider any offer. Spivey, 488-0369.

7'6" surfboard, good shape, fast, turns well with wave, variable fin, \$75. Dusenbury, 877-3230.

Clear Lake Country Club golf membership. Nugent 488-3136.

Go-cart with year old engine, excellent condition. Jones, 944-1321.

Twin size headboard, \$10; queen or double size headboard, \$25; oil painting, \$25. Lea, 488-2597.

Improve engine performance, new Delta Mark Ten ignition system, 12 volt negative ground, \$18. Behrend, 487-1298.

Conn trombone, like new, used one year, cost \$160 will sell for \$90. Hammack, 877-1657.

Franciscan earthen wear, service for six, plus serving pieces, solid white, \$25. Barron, 488-4258.

Weich folding baby carriage, liftout body, doubles as carbed, good condition, \$12. Hooper, 488-4120.

Three cushion sofa and matching easy chair, brown vinyl, \$50. Pawlowski, 591-2095.

Large ceiling fan, includes hanger attachments, wooden blades, black, \$35. Hill, 471-4305.

AUTOS

65 Chevrolet Super Sport, V-8, automatic transmission, power, AM-FM radio, 56,000 miles, green-blue, white interior, \$900. Lovell, 482-1954.

66 Dodge Dart, standard transmission, 2 dr HT, \$725. Kanyuck, 488-3326.

55 Thunderbird, automatic transmission, very clean, \$1,800. Take pickup in trade. Thomas, 471-2976.

61 Chevrolet Impala, 4-door, automatic transmission, radio, excellent mechanical condition, \$335. Greenwell, 488-1034.

Triumph TR-3, new tires, new baked on paint, new carpet, excellent condition, see to appreciate, \$900. Herron, 488-3969.

68 Dodge Coronet 440, two-door hardtop, 383-V8, automatic transmission, air, power, vinyl top, dark green, \$1,975. Turner, 487-3408.

66 Ford Country Squire, 10 pax, fully equipped, low book. Cox, 487-3605.

61 Rambler American, white, runs well, good mileage, \$195 cash. Muhly, GR1-3762.

66 Chevrolet Belair, power steering & brakes, automatic transmission, radio, heater, air, \$1,000. Watkins, 534-2437.

67 Mustang, automatic transmission, air, power steering, radio and heater, good condition. Martin, 649-2119.

66 Oldsmobile 98, 4-door sedan, all power, five new tires, clean. Waddell, 932-3881.

63 Chevrolet II, six cylinder, automatic transmission, 4-door, runs well, looks bad. Mabley, HUB-3241.

63 International step van, runs well, ideal for camper/surfer, \$350. Hodge, 591-2152.

66 GMC and camper, 3/4 ton, 4 speed, 306-V6, 8 foot camper with sink, stove, water, sleeps three, best offer. Campagna, 591-2074.

67 Camaro, 327 engine, automatic transmission, air, power steering, \$1395, Martisek, 482-3964 after 5:00.

70 Chrysler Newport Custom, new tires, loaded with extras, low equity, mileage, excellent condition. George, 862-5168.

66 Buick Wildcat, 4-door hardtop, air, power steering, brakes, excellent condition, 38,000 miles, \$1,595. Jones GR9-4653.

68 VW, perfect condition, four new tires, \$1,150. Call 649-7103.

68 VW Camper, pop top, fully equipped, new engine, excellent condition, \$2,345. Jones GR9-4653.

67 Sunbeam, Alpine Series, V convertible, 10,000 miles remain on warranty, new engine, new tires, wire wheels, excellent condition. Jones, 944-1321.

63 VW, 75,000 miles, rebuilt engine, new battery, brakes, muffler, make offer, Wilkes, 925-3654.

65 Chevrolet one-ton truck, heavy-duty, mechanics bed. Frazier, 485-3521.

67 VW, radio, good condition, \$900. Akin, 941-1631 after 5:00.

64 Chevrolet Impala, 4-door, automatic transmission, V-8, power steering, \$450. Erickson, 649-0396.

WANTED

Girl to share 2-bedroom apartment. Across from NASA. Gooding, 591-2093 after 5:00.

Pickup truck, 1/2 ton, four to six years old. Must be dependable. No camper. Stephens, 487-0095.

Furnished room or efficiency apartment within 10 miles of MSC. Starting mid-September. McCandless X-4464.

20-gauge shotgun, for use by boy. Weitz, 591-3071.

Will trade my house in Palos Verdes, California with yours here, or will lease. Nimr, 771-0815.

Small used boat trailer, suitable for hauling 14-foot aluminum fishing boat. Call 932-2836 after 5:00.

PETS

Alaskan puppies, (the Malamute sled dog), gentle pets, beautiful, \$50 to \$200. Call 488-3702 or 483-4641.

Baby gerbil, playful and healthy, \$1. Erb, 877-1097.

AKC registered German Shepherd puppies, black and tan, males and females. Kennedy, 932-2760 after 4:30.

Sealpoint Siamese kittens, six weeks old on July 31, \$15. Murray, 474-3373.

AKC Beagle puppies, five and six weeks old, males \$30; females \$25. Abel, 946-8245.

Male registered miniature poodles, silver or chocolate. Davis, 453-0418.

Poodle puppies, Royal standard, white, \$50. Wittry, 877-2735.

REAL ESTATE

Furnished one bedroom apartment for rent, Bayfront. Quiet person only. \$125 per month with utilities. Hill 471-4305.

For rent 4-2-2 brick in College Park addition, Deer Park, near schools, built-ins and carpets, \$225. Available September 1. Marler, Call 479-2651 for appointment.

For sale 142.6 acres, cabin, all electric, modern bath, rock fireplace, two wells, pines, barn, lake site, \$26,500. Nickerson, 477-3513.

Wooded lot, 100 x 150, Baywood Subdivision, private pier and marina, \$4,200. Larson, 471-0068.

PERSONALS

Mrs. Evelyn Larson, sister-in-law of Mark Larson, an MSC employee with the Space Electronics Systems Division, is expected to undergo surgery for kidney transplantation. The actual cost for the transplantation will amount to several thousand dollars. An appeal is made for funds to pay for this costly surgery. Contributors may make their tax deductible donations to the Larson-Smith Twin Kidney Fund, % Forth Worth National Bank, Forth Worth, Texas or contact Mr. Larson at 471-0068.

MSC Golf Group Holds Tourney

The MSC Golf Association held its sixth tournament of the year at the Glenbrook Park Golf Course August 8. Bob Epperson had the low gross score of the day: 75. Sam Gloriosos won the championship flight with a net 64; Epperson was second with 65; Dave Chenault, third 67; and Bill Khipkey, fourth, 68.

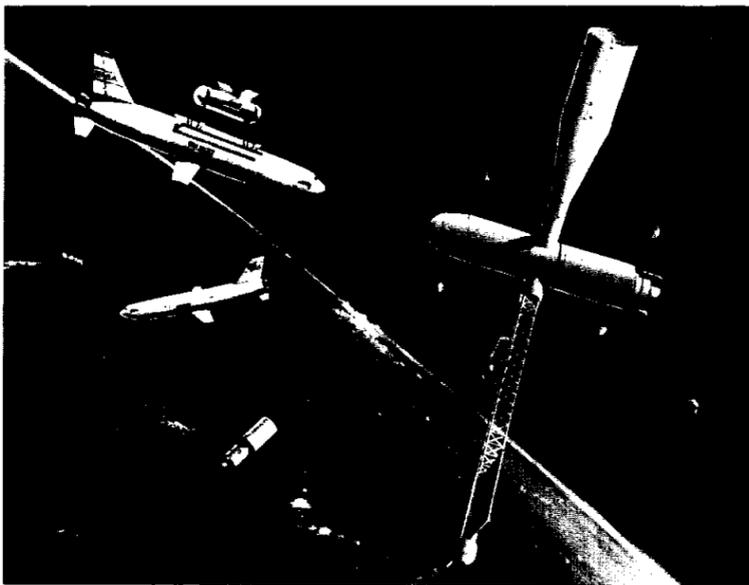
The first flight was won by Lou Braun with a net 65; Mike Hendrix was second with 66; T. F. Gibson, third, 69; and John Frere, fourth, 70. Sam Sandborn won

the second flight with a net 63; and Bob Sampson, Morgan Cooner and Bob Lacy tied for second with 65's.

Meeting set for Flag Football

There will be a Flag Football League organization meeting on August 20 at noon, Room 316, Building 2. Representatives from teams planning to participate should be present.

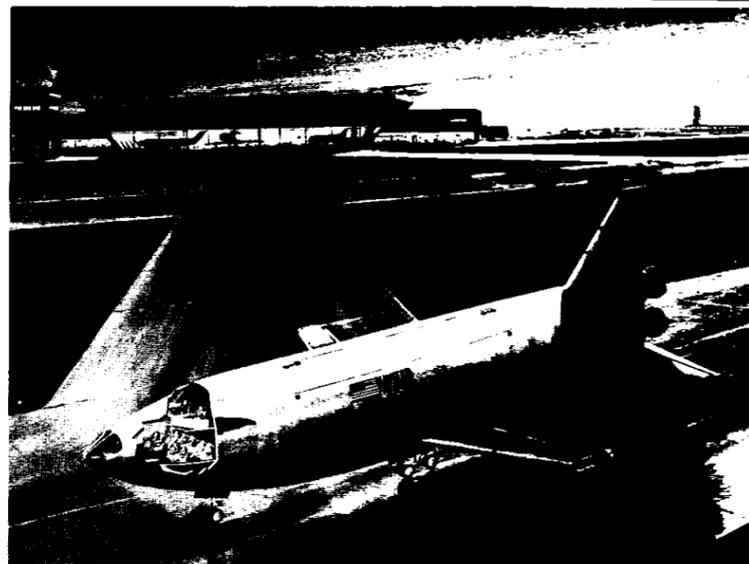
MSC and active military personnel are eligible. Further questions and those interested in officiating are asked to contact Dennis Doherty, X2741.



Rendezvous with Space Station



Orbiter entry



Taxi to terminal

Shuttle to Cut Space Costs

The one year since American astronauts walked on the Moon's dusty surface has been filled with dramatic and significant developments in our nation's space program. A second astronaut team landed on the Moon, and returned to Earth with their precious cargo. The unexpected rupture of an oxygen tank in the service module caused Apollo 13 to fail and the resulting emergency a quarter of a million miles out in space put the Apollo team to its severest test to date.

Another extremely significant event was the establishment of a clear course for the future of the nation's space program. After reviewing the report of the Space Task Group, the President directed that new goals be developed by the National Aeronautics and Space Administration. In his statement of March, 1970, he laid down three general purposes that are to guide NASA's efforts: (1) exploration, (2) scientific knowledge, and (3) practical application.

In line with this philosophy, NASA has awarded to industry parallel design and planning studies on a space shuttle vehicle which could reach flight status in the late 1970's.

This \$16 million study effort is monitored by two different NASA field centers. One contract, with the McDonnell Douglas team is under the direction of the George C. Marshall Space Flight Center in Alabama. The other contract, valued at \$8 million is with North American Rockwell Corporation, Space Division, Downey, California. It is directed by the Manned Spacecraft Center in Houston.

Heading the group here at MSC is Robert F. Thompson, manager of the Space Shuttle Program. In addition approximately 25 technical, administrative and clerical personnel are assigned to his office.

The program office is the so-called top of the shuttlecraft iceberg. Providing the broad technical base are experienced personnel from the Engineering and Development, Program Control and Contracts, Flight Operations and other directorates whose manage-

ment expertise help focus on the problem.

"This task is a total Center effort," according to Thompson, "drawing on more than the talents of a couple of dozen persons."

A primary objective of the shuttle study is to develop economical transportation. In order to achieve the goal of low cost transportation, the contractors are called upon to: (1) define the space shuttle system; (2) obtain cost and schedule information; (3) define a test effort; (4) investigate and obtain understanding of the supporting research and technology, and (5) accomplish preliminary design of orbiters capable of low aerodynamic cross range.

The shuttle will be a two stage vehicle. A piloted booster, launched vertically from a launch pad like those at the Cape, will carry a spacecraft, called orbiter, piggy-back part way to Earth orbit. The booster then will be flown back to a landing site and readied for the next mission, and orbiter will continue into space.

Total weight of the two vehicles at liftoff is approximately three and one-half million pounds, and they stand about 300 feet tall. The Apollo Saturn V rocket by comparison stands 363 feet high and weighs more than six million pounds.

Booster weighs approximately 2,900,000 pounds with the orbiter accounting for approximately 600,000 pounds. Booster is equal in size to a US Air Force C5A Galaxy aircraft and the orbiter is approximately the size of a conventional commercial jet passenger aircraft.

Ablative materials which are thick and relatively expensive probably will not be used on the shuttle. This makes it necessary to hold down temperatures on most of the surfaces to approximately 2,000 degrees (F) or less.

Lower orbiter temperatures can be achieved by hitting the atmosphere at a very high attack angle, perhaps 60 degrees or more. The vehicle thus will enter with lower heating rate; therefore, a winged-configuration shuttlecraft with large

fuselage (similar to those shown here) is a likely candidate.

Propulsion will be from chemical fuels, much like today's Saturn family of rockets. A liquid hydrogen-liquid oxygen combination probably will be used.

Total burn time of a flight might be up to 1,500 seconds, and the engines must be capable of several restarts; perhaps as many as five per mission. Bell-type engines are planned for both the booster and orbiter.

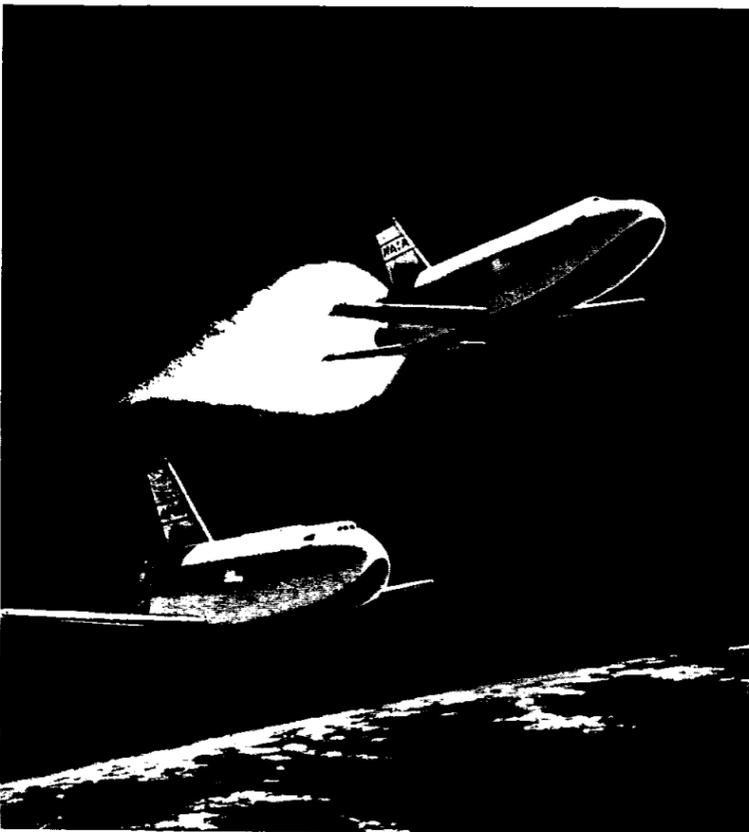
Current studies call for booster and orbiter to have a multi-man crews. The vehicles will have a life of up to 100 missions with the orbiter requiring the additional capability of remaining in space from one to thirty days. All vehicles must be capable of landing horizontally.

The shuttlecraft is launched from a vertical position. Orbiter rides piggy-back atop the booster to an altitude of about 200,000 feet. On the fringes of space (approximately three minutes after lift-off) the orbital shuttle vehicle separates and heads for its rendezvous in space. Meanwhile, the booster, after staging, rolls 180 degrees with the crew flying heads down in relation to Earth. A second 180 degree roll is executed and the booster returns to the launch area it had left moments earlier.

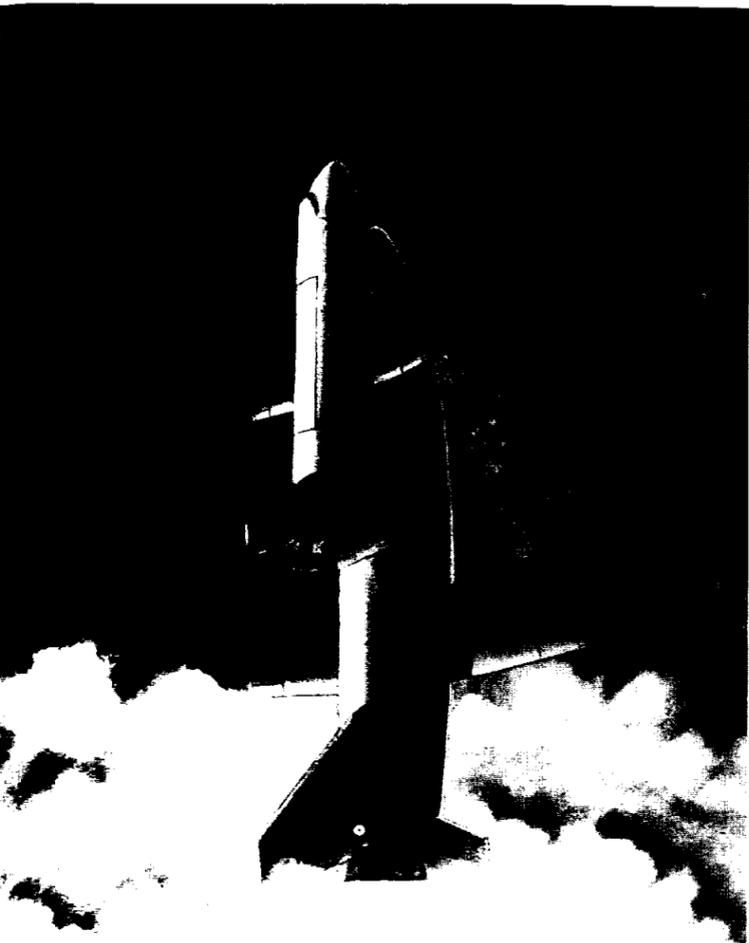
Current studies call for the orbiter to be injected into a parking orbit approximately 50 by 100 nautical miles. Orbiter then will fly into a 270 nautical mile circular orbit, and be capable of covering areas above Earth as far north as Ketchikan, Alaska and as far south as the Straits of Magellan.

Typical missions include: (1) space station support; (2) placement and retrieval of satellites; (3) delivery of propulsion stages; (4) delivery of propellant; (5) satellite maintenance, and (6) rescue of disabled spacecraft.

Upon completion of its space tasks, the 200,000 pound orbiter departs its station by firing retro-rockets. It reenters Earth nose pitched up. At approximately 60,000 feet the vehicle approaches subsonic speed and levels off and lands like a jet aircraft.



Staging at 200,000 feet



Lift-off